AFRICA TRADE and DEVELOPMENT

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AIRBORNE GEOPHYSICAL SURVEYING IN CENTRAL AFRICA

THE NILE WATERS AGREEMENT

Continuing Search for Oil

Sudan Development 1959-1960

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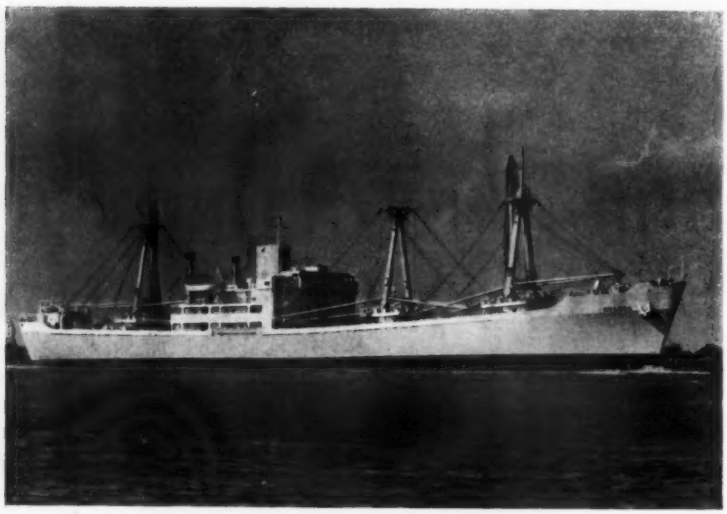

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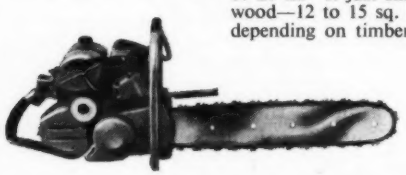

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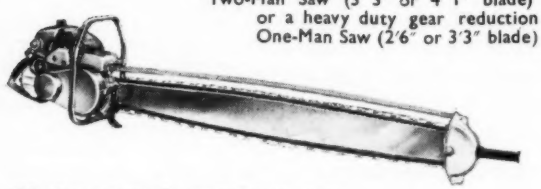

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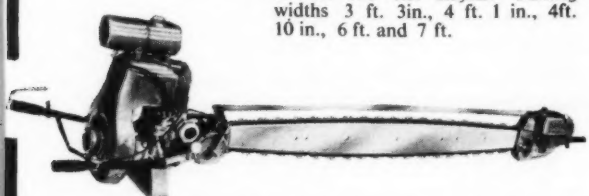

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Anglo American Corporation of South Africa

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and its associated companies are chiefly concerned with the mining of gold, diamonds, copper and coal in South Africa, South-West Africa and Rhodesia.

GOLD The Corporation administers 12 producing gold mines in the Transvaal and Orange Free State. These mines are now producing more than £6 million of gold a month, making the Corporation the largest individual gold producing group in the world. Six of the mines also produce uranium. The newest gold mine in the group, Western Deep Levels, will eventually be the deepest mine in South Africa, going down to a depth of nearly two and a half miles from the surface.

COPPER Nchanga, the largest producing copper mine in the British Commonweath and Rhokana, together account for about half the output of Northern Rhodesia which is the third largest supplier of copper in the world. Bancroft, the third big mine in the Group restarted production on 1st April this year and is now producing copper at the rate of 50,000 tons per year.

COAL The collieries administered by the Corporation produce 38.4% of the total coal output of the Union of South Africa. In Rhodesia the Wankie mine supplies nearly all the coal and coke used in the Federation.

DIAMONDS The Corporation acts as Consulting Engineers to the De Beers group in which it holds a substantial interest. In 1958 the mines in the De Beers group produced gem and industrial quality diamonds valued at £27 million. The Corporation recently became Consulting Engineers to the Williamson Diamond mine in Tanganyika.

The Corporation also has interests in the production of lead and zinc, monazite, titanium, hard metals, bricks and tiles.
The Group spends annually several hundred thousand pounds on prospecting for new deposits in Southern and Central Africa.

A A C

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The Sudan Development Budget, 1959/1960

by Our Economic Correspondent (Sudan)

IN THE SUDAN active consideration is now being given to the reorganization of the development administration machine and to the preparation of a Five-Year Development Plan.

Prior to the Plan a Development Budget, 1959/60 has been announced. Total investment is given as £12,789,473 broken down as follows:

	Investment (£S)	%
Productive Schemes	5,965,940	45.9
Social Services	3,353,552	26,2
Administration	1,503,763	11.7
Communications	1,269,299	9.8
Research and investigations	403,639	3.7
Public utilities	313,350	2.7

This is the largest total investment figure so far allotted to an economic programme. In formulating this budget certain considerations have had to be taken into account, the most important of which were to allow for the sanction of funds granted to schemes already started and so far unfinished; to provide new money to complete these schemes; to give priority to those schemes which would make the quickest and surest returns and to meet a reasonable demand for increased social and administrative rural water and security services.

The five main projects allowed for under the Budget are:

(1) *The Sennar hydro-electric power station and the extension of the Burri power station.* There are three definite targets. The construction of a 15,000 kW hydro-electric power station at the Sennar Dam; the strengthening of the Burri Thermal Power Station at Khartoum by 1,000 kW and the construction of transmission lines between Khartoum and Sennar.

The Burri power station is scheduled to be completed by February 1961 and the Sennar hydro-and-transmission lines between Sennar and Maringan by August 1962. The estimated cost of this project will be £S 4.7 million of which £S 559,502 was spent during 1958/59 and £1,019,950 is scheduled for 1959/60.

The increased use of electricity which will be possible when these schemes are completed, will, it is hoped, expand considerably Sudanese development. The increased capacity will meet the needs of the growing residential, agricultural and manufacturing demand and domestic lighting will be available in the Khartoum-Sennar area. More power will be supplied to the ginning factories at Hassaheissa and Maringan, to the pumps providing water for agriculture from the Blue Nile and to the new factories for sugar, textiles and for light industries which are planned in the Sennar-Khartoum area.

It is estimated that the benefits accrued by the saving on fuel costs alone will repay the capital costs of the projects within seven years.

(2) *Half of phase III of the Managil Extension.* Work on half of phase III will be continued at an estimated cost of £S 3.6 million. Due to lack of sufficient funds it is not considered possible to complete the whole of phase III at present. Out of 100,000 feddans (1 kantar = 99.05 lb : 1 feddan = 1,038 acres) which will be made available for agriculture, 35,000 feddans will be put under cotton which is expected to yield an average of 4 kantars per feddan. With an average return of £S 8 per kantar the gross proceeds from lint cotton would amount to £S 1.2 million without taking into account the proceeds from cotton seed, scarto and other crops.

(3) *The Sugar Industry.* The Budget allows for the provision of £S 22,860 to start experimental production in an area of 250 feddans in the Guneid area.

(4) *The Coffee Industry.* It is hoped to encourage the production of coffee in Equatoria and Darfur sufficient to provide for the Sudanese domestic consumption. This would entail the use of 20,000 feddans of which 8,000 feddans would be developed by the Government for the benefit of the local population in the form of settlement schemes. The other 12,000 feddans would be run by private enterprise, £S 27,800 has been allotted under the Budget.

(5) *Jebel Marra.* Investigations have already been carried out for the possible development of the Jebel Marra Area. It is hoped to develop irrigated agriculture in Northern Darfur. It is known that water is available in reasonable quantities and a soil survey has shown an area of 320,000 feddans of soil suitable for agricultural purposes. A further factor which will increase the possibilities of opening up this area is the extension of the railway of Nyala. A sum of £S 20,000 has been allotted for further investigations.

Among the other sums allotted, the most important include:

Agriculture. £S 132,611 has been given to the Department of Agriculture which will be used, apart from the coffee and sugar schemes already mentioned, to complete a date and fruit-processing and industrialization factory in Karima and the Shambet Agricultural Institute, for the establishment of the Northern Province Seed Improvement and Seed Testing Farm and the general extension of mechanization.

Forests. £S 108,270 will be used for the creation of forest preserves, the development of the gum industry and for new sawmills which will meet the demand for railway sleepers.

Land use and rural water development. £S 371,745 has been revoted, an American aid grant of £S 536,748 and £S 197,500 have been received under the 1959/60 Budget. Twenty-five water yards, 34 haffirs and 3 dams are due to be built in areas badly needing increased water facilities. Fifty existing haffirs will be rebuilt or strengthened.

Animal resources. New livestock improvement centres are the main item together with tsetse fly control and reclamation, poultry improvement and veterinary research in general. A dairy factory in Khartoum (£S 128,304) will be established with US aid. Total allotment under the Budget is £S 115,000.

Posts and Telegraphs. £S 385,266 has been granted for strengthening the Khartoum, Omduram and Medani telephone systems, the development of the Dongola loop and Darfur telephone—telegraph service, Provision has also been made for the extension of postal services. private letter boxes and the automisation of the Gezira telephone network.

Civil Aviation. Extensions and facilities to the international airport at Khartoum which are considered to be necessary in view of the increasing traffic have been put in hand. Expenditure will be £S 129,844.

The Sudan Mint. The Mint is expected to start operations towards the end of 1959 but the building has not been finished and a further £20,000 has been provided to allow for its completion during 1959/60.

Stores and equipment. £38,936 will be used to meet the rising demand for uniforms for Government employees. Additional machinery has become necessary, and it is hoped to manufacture the materials needed in the Government workshops whereby reducing costs.

Health services. £S 443,900 has been revoted and a further £S 208,741 allotted under the new Budget for the construction of two new hospitals at Zeidab and Sinkat and five new dispensaries. New dressing stations will be built and Public Health Offices opened at Um Ruaba, Abu Gebieha, Zeidab, Rigl Eulam and Derbar.

Allocations for police services, local government, public works and mechanical transports amount to £S 695,768.

(The Sudanese pound—£S— equals £1 0s. 6d. sterling.)

Continuing Search for Oil in Nigeria

Mobil Exploration Nigeria Inc, started its exploration efforts in November of 1955. In the early stages all of the area of Nigeria which seemed to have any promise of oil occurrence, and, which was then not under licence to oil companies, was studied.

The object of these initial studies was to enable the company to concentrate eventually its efforts of oil finding upon those areas which held out the most promise. This process of elimination of less promising areas has led to the present concentration upon a licence area of some 4,000 square miles located in South-Western Nigeria.

In May 1959, the company completed its first year of exploration for oil on its licence area in Lagos, the Colony, and part of the coastal area of the Western Region of Nigeria.

Surveying the Land

Since the first seismic shot was fired at Ajilete, the company has used three separate seismic survey parties to acquire information during this first year of operation. These parties have completed surveys of many hundreds of miles across the land and sea portions of the licence area.

One reflection seismograph crew has been in continuous operation since May 1958. Its base camp was located at Ajilete and at Ikorodu during 1958, and it has carried out a seismic survey along existing roads in the southern half of the licence area. This crew employs from 200—300 Nigerians locally and at present is based at a camp at Badagry.

A second land-based seismic crew was also active in the area from July to November 1958. It operated from camps located at Ilaro, Ikeja, Shagamu, Ikorodu and Ajilete, engaging its work force from the local areas. The efforts of this crew were concentrated primarily along the roads in the northern half of the licence area.

Off-shore Survey

Early in 1959, Mobil employed the crew of the S.S. *Seislim*, a specially equipped seismic survey ship, to conduct a survey of the off-shore waters of the company's Western Licence area. The ship, one of two of its kind, worked as a self-contained, scientific unit, with all the necessary equipment needed for conducting seismic operations at sea.

The *Seislim* towed a half-mile cable with sensitive receiving instruments attached at intervals along its length. Small charges of dynamite were connected to a second cable which was also floated behind the ship. These charges were then exploded at pre-determined locations.

The explosion sent shock waves through the water and into the rock layers below the ocean floor. The rock layers reflected the shock waves back to the surface where they were recorded by the sensitive instruments attached to the cable. These instruments, called geophones, then transmitted the impulses as electric signals, through the cable to the central recording equipment aboard ship.

The recording equipment in turn transformed these electric signals to a magnetic tape, which was photographed by special equipment. These photos serve as a permanent record of the type of structure underlying the off-shore waters. Skilled Mobil seismologists are currently studying the seismic photos, taken by the crew of the S.S. *Seislim*, to calculate the possibilities of finding oil in Nigeria's western waters.

Geologic Studies

In addition to the seismic surveys, geologic studies have also been underway during the year.

Mobil Exploration has collected a great amount of data during the past few years. Studies of this data by the company's technical experts is progressing.

Among the experts are geologists who are charged with the responsibility of preliminary surveys to locate areas where the chances of finding oil are highest. They determine the most promising areas through aerial photo studies and field investigations. Mobil geologists are now busy making a study of the company's licence area in the Western areas. Specifically they are looking for sandstone, limestone, and other rock strata that could contain oil.

It is still too early to know the full story of the results of the search, but much progress has been made and the company plans to continue its thorough investigations in the search for oil in Nigeria.

A shot is fired during continuing seismic operations

This seismic crew which is attached to Mobil Exploration Nigeria Inc, has drilled the equivalent of 24 miles into the earth in the past 12 months

GENERAL DEVELOPMENTS

Ghana Airways

The first annual general meeting of Ghana Airways Limited was held at the company's offices on the 15 October 1959. The Ghana shareholders were represented by Mr. James Mercer, Chairman of Ghana Airways, and Mr. B. F. Bolt of the Ministry of Transport and Communications, and the BOAC shareholders by Sir Duncan Cummings. The Minister of Transport and Communications, the Hon. Krobo Edusei, addressed the meeting and was present throughout the proceedings, Also present were Mr. Victor Akakpo, the newly appointed Director of Ghana Airways, Captain G. P. Wood, the General Manager and other Government and airline officials.

The Chairman's report and the annual accounts revealed most satisfactory financial results. Internal air services in Ghana have always been operated at a loss and when Ghana Airways was established it was forecast that the loss would amount to £200,000. In the event the loss on internal services was only £184,000 and this was inflated by the need to use chartered aircraft during the first few months of the Company's existence. Since the introduction of Britannia aircraft on the international services a profit on them has been made which in three months amounted to over £10,000. The net operating loss was £174,000. The most recent operating figures show that losses on existing services will be substantially less in 1960.

All aspects of the Company's affairs were examined during the meeting and the Government representatives were able to express full satisfaction with and complete confidence in the Chairman and his Board of Directors in the discharge of their duties during the first difficult year of establishing Ghana Airways.

Development Plans (Rhodesia)

It is expected that the Federation will be be able to raise all the overseas money required for its £77,000,000 development plans over the next four years.

The Federal Government's development plan for 1959/63 provides for an expenditure of £77,000,000, of which £37,000,000 will be borrowed from various sources. The Federation has a special interest in the American-proposed International Development Association. The IDA would have its capital subscribed on the same basis as the International Monetary Fund and the World Bank. But, unlike the Bank and one of its off-shoots, the International Finance Corporation, the IDA would be able to give loans to underdeveloped countries for general development and social investment purposes.

Egypt to buy Comets

The Egyptian airline, Misrair, have confirmed that negotiations are nearly concluded for the purchase of three Comets from de Havilland. The aircraft which will go into service next June would cost approximately £4 million. The Misrair fleet at present consists of Viscounts, Vikings and Dakotas.

Tobacco Research Programme (Rhodesia)

A second five-year tobacco research programme, expected to cost more than £1,000,000 has been approved by the Council of the Rhodesia Tobacco Association. This is about £50,000 more than was budgeted for the first five-year plan which ends next June. The new plan, to run from July 1960 to June 1965, will be financed by the RTA and the Federal Government.

First Insecticide Factory (Ghana)

On 5 November the first ICI insecticide factory in Ghana was opened at Tema. The plant has a capacity of 500,000 gallons annually. The insecticide will be sold under the trade mark of PP "Kumakate" and is formulated ready for spraying. It is expected that it will be possible to reduce the effects caused by the capsid bug on the cocoa crop and it is planned to spray some 2½ million acres of cocoa trees in the next three years. This will cost £12½ million, employ 14,000 people and use a minimum of 700,000 gallons of insecticide.

Capital Expenditure (Uganda)

Capital expenditure in Uganda is to be reduced over the next few years. From £6 million the figure is likely to be £5½ million next year and £4½ million in the two succeeding years. Allocations of capital are being revised to give priority to expenditure which will lead to an early increase in production or revenue or to economies in government expenditure.

Vacuum Cleaner for Airport

A vacuum cleaner powered by a 90 hp diesel engine and carried on a 110 hp diesel truck has been purchased from Germany by East African Airways. It will be used for cleaning the apron and runways of Embakasi Airport Nairobi, and cost over £7,000.

UN Economic Commission for Africa

The next meeting of the UN Economic Commission for Africa is scheduled to take place in Tangier from 25 January to 8 February 1960.

Belgian Congo

Recent changes in the Customs Tariff effect tyres and tubes; carboys, bottles, flagons, jars, pots, tubular containers and similar containers of glass; various kinds of bottles; aluminium plates, bars, angles and sections for use in structural works and certain types of motor vehicles and cycles.

New Oil Company Formed (Kenya)

The subscription list opened for 49,943 £1 Ordinary Shares in the newly-formed Kenya Oil Company Ltd, has been over-subscribed. The formation of the Kenya Oil Company, the first oil company in Kenya to be directed, staffed and financed by Kenyans, was announced recently in Nairobi. Shareholders were being asked to subscribe £52,000 of the authorized capital of £60,000. Under a 20-year Agreement, the company will obtain bulk supplies of oil products from Caltex (Africa) Ltd for marketing under its own name. It is proposed to market petrol, kerosene and diesel fuels throughout Kenya.

Finnish-Africa Trade

The following table shows trade between Finland and certain African countries for the first 7 months, 1959 (million marks) :

	Imports	*Exports*
Egypt . .	86.1	275.8
Tunisia . .	22.6	78.1
Morocco . .	63.0	258.2
South Africa .	265.7	779.2
Fed. Rhodesia and Nyasaland .	9.9	42.5
Mozambique .	—	35.4

Belgian Congo Exports

The monthly average for Belgian Congo and Ruanda-Urundi exports rose to 2 billion 3 hundred million Congolese francs in 1956. In 1957 they dropped to 2 billion and in 1958 to 1 billion 7 hundred thousand. During 1959 the trend is again upwards, in January the export figure was 2,016 million francs, in July 2,547 and the total figure for the months January-July is given as 14,168 million francs. Foreign sales have been able to increase due to the accrued shipments of copper, Arabica coffee, cobalt and rubber. A drop, however, has been reported in the export of diamonds.

The question of voluntary restrictions on exports of coffee is to be submitted to the local assemblies in the Congo and Ruanda-Urundi. Pressure has been brought to bear by the Latin American countries who, with a view to stabilizing world prices, have decided to reduce their exports by 12%. Coffee exports from the Congo are sent largely to countries other than Belgium and would thus be affected more seriously than production in Portuguese and French territories where most of the crop is sent to the colonial power whereby escaping the proposed reduction restrictions.

A strict quality control is already in force in the Congo and it is felt that further restrictions might bring hardship to African growers

Airborne Geophysical ey

by a Special nt (J

ALTHOUGH AFRICA IS NO LONGER "The Dark Continent", it is still largely undeveloped and relatively sparsely populated by Africans of varying degrees of primitiveness.

Experience has shown that of all the potential resources of undeveloped areas, minerals offer probably the firmest foundation for economic advancement and social betterment.

It is fortunate, therefore, that in Africa there are still great tracts of land open to commercial exploration for minerals—vast areas of Crown land, or land of which the mineral rights are held under Royal charter. In the Rhodesias, for example, all mineral rights in the territories belong to the British South Africa Company until 1986.

We can fairly assume that, in Northern and Southern Rhodesia and in Tanganyika, all easily found mineral deposits have been discovered; and continued search must, therefore, become increasingly scientific and make use of any techniques capable of giving clues to minerals whose presence is not evident on the surface.

Prospecting in Central Africa is being carried out by Anglo American Corporation of South Africa, Limited, as consulting geologists, on behalf of two of its associated companies—Chartered Exploration Limited and Western Rift Exploration Company Limited. The former company (in which the British South Africa Company holds a 50 per cent interest) has prospecting rights over an area of 120.000 square miles in Northern Rhodesia and the latter over 34,000 square miles in Tanganyika.

In these areas of undeveloped territory, selected because the known geology suggests strong possibilities of mineralization, it is believed that a prospecting programme using specialized skills and techniques will reveal the existence of payable mineral deposits buried under soil or deeply imprisoned in rocks.

As the concession areas are so large, it did not seem possible to prospect them without using airborne geophysical surveys as an aid to delimiting areas for more intensive ground work. Were the surveys carried out entirely on foot, hundreds of trained geophysicists and geologists would be needed, with an equivalent amount of technical guidance, instrumentation, administration, road making and so forth —and all these skilled men are simply not available. An aircraft manned by five men can, if conditions are favourable cover 600 miles every working day or up to 10,000 miles a month, and so can usefully supplement the work being done on the ground.

Geophysical prospecting is aimed at assisting in the search for mineral deposits by determining the nature of the subsurface geologic structure of the earth. For this purpose surface measurements of physical quantities are taken.

It can be applied only if there are differences in the physical properties of the geologic bodies being sought and their surroundings—differences in electric conductivity, radioactivity, magnetic susceptibility and several other factors.

Information obtained from measuring the physical effects of geologic bodies is indirect, as it is possible, of course, that a small body at shallow depth exerts the same influence as a large body at greater depth. Nevertheless, a combination of geophysical evidence from which to reason geologically has much value for the geologist.

A necessary preliminary to an airborne survey is the taking of high-level aerial photographs of the entire area to be worked over. These photographs, on a scale of about 1 in 30,000, are carefully assembled in a *mosaic*, so that the track of the survey flights can be planned.

Prominent topographical features are selected as check points or *fixes*, and flight lines at quarter-mile intervals are marked on the mosaic.

The prime problem to be faced in an airborne survey is to direct the aircraft precisely along a pre-determined flight track and later to establish with accuracy (within 50 to 100 feet) over which ground the aeroplane actually did fly.

As a high degree of flying precision is required, the twin-engined aeroplane, which carries two pilots, a navigator and two geophysical instrument operators, is equipped with special navigation aids. A gyrosyn compass enables the pilot to remain on course with an accuracy of about 200 yards. An essential instrument is a radio-altimeter which shows true height above ground. It is necessary for the pilot to fly over the terrain as low as possible consistent with safety. If he flies higher than 450 or 500 feet, the instruments recording information about the ground below become less effective, as their range is restricted. The height indications are given to the pilot in the form of miniature traffic lights—red, orange, green—which tell him when he is too low, at correct height or too high respectively.

To facilitate plotting the aircraft's actual flight track accurately on the mosaic of high-level photographs, the aeroplane carries a *spotting* or *strip* camera, which at 1½-second intervals continuously photographs the ground beneath on 35 millimetre film. These photographs are automatically numbered as they are taken and are correlated with the recording tapes of the electronic geophysical instruments carried.

The geophysical apparatus consists of a magnetometer, an electromagnetometer and a scintillation counter.

Not only does the earth possess magnetism, being surrounded by a magnetic region or field, the intensity of which varies with time and locality, but rocks of the earth's crust have the capacity for being magnetized in differing degrees. This is known as their magnetic susceptibility.

In general, igneous rocks have high magnetic susceptibilities and sedimentary rocks are comparatively non-magnetic.

If geologic bodies of different intensities of magnetization are present, the magnetic fields surrounding them cause distortions or *anomalies* in the earth's magnetic field in the neighbourhood.

An intricate electronic magnetometer measures and records these anomalies in units of magnetic field intensity called *gammas*.

Aerial Surveying in Central Africa

Special Correspondent (*Johannesburg*)

Most magnetic anomalies are caused by the presence of magnetite (an iron ore) in igneous and sedimentary rocks and in some iron ore deposits; and these anomalies may range from a few gammas to several thousand gammas above or below the value of the earth's magnetic field in the vicinity. From the recorded readings a contour map is produced.

Although magnetic methods of prospecting do not give an exact picture of the configuration of a geologic body, they do enable fairly exact inferences to be drawn about the body or mass causing an anomaly in the earth's magnetic field.

The electromagnetometer is an instrument for measuring the conductivity of the ground below the aircraft. Many important ore bodies, particularly those of lead, zinc and copper, consist of sulphide minerals having high electrical conductivity. Graphite and water containing salts are also conductors.

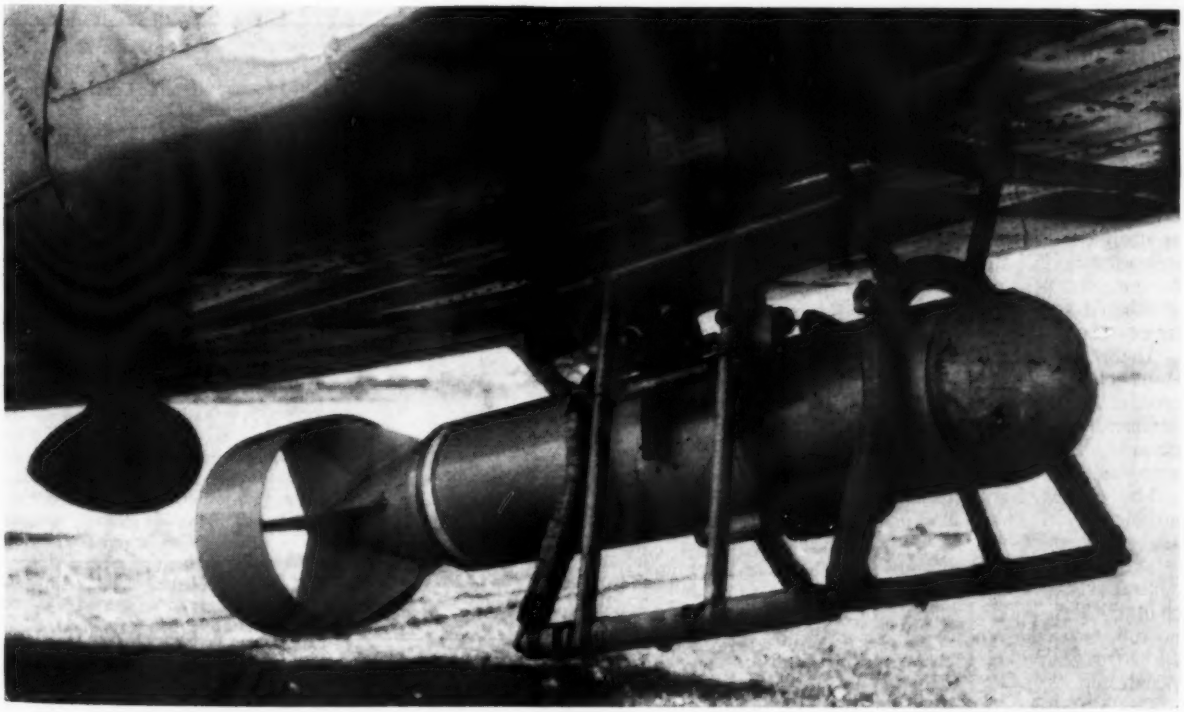
The electromagnetometer employed uses frequencies of 400 and 2,300 cycles per second. The idea is to excite the ground by alternating magnetic fields from a transmitter coil and, at a suitable distance away, have a receiver coil which is designed to detect the secondary fields that have their origin in the ground below and separate them from the primary field created by the transmitter coil.

In the method being used, the transmitting or exciter coil is on the aircraft, and the receiving coil is contained in a cylinder or *bird* which is towed below and behind the aircraft at the end of a 500-foot cable operated by a small electric winch.

The receiving coil measures and records the phase angle of the two frequencies picked up. The lower one (400 cycles per second) has more satisfactory ground penetration, and the higher one (2,300 cycles per second) is more affected by the surface materials and particularly by their water content. It is thus possible to differentiate to some extent between conductors of different types and to eliminate partly those containing superficial water.

Although now and again it is possible to pick up an ore body directly by electromagnetometer, the main function of this kind of prospecting is gathering information which leads to a picture of geological structure and of the types of rock in that structure. From this, one can go on to eliminating, by inference, much unpromising ground and directing attention to ground more likely to contain minerals.

The scintillation counter measures gamma radiation



The external fittings of an aircraft used for electromagnetic (E.M.) surveys. In flight a detecting coil is lowered in the bomb-shaped container at the end of 500 feet of cable.

(Photo: Hunting Aero Surveys Ltd)

from radioactive materials in the ground below. Thorium and uranium are ubiquitous in the earth's crust to the extent of a few parts per million. Both elements in the course of disintegration give rise to a whole range of daughter atoms which include the radioactive gases, radon and thoron. These gases can diffuse out of rocks or soils and spread radioactivity over the neighbourhood and into the lower layers of the atmosphere, if the uranium and thorium are not too deeply buried.

Depending on their quantity and nearness to the surface, these elements give rise to gamma radiations of varying strength or hardness; and, though the gamma rays lose some energy in their passage through the air, a substantial amount of radiation is easily detectable 400 or 500 feet up.

The operation of the scintillation counter depends on the property of certain crystals and plastics to fluoresce momentarily when one of their molecules is bumped by a *photon* of radiant energy. Crystals of sodium iodide are used, and the very weak illumination induced by gamma radiation is detected by the cathode of a photomultiplier and converted to electrical impulses, which are amplified and counted and finally shown on a meter calibrated in counts per second. This gamma radiation has to be measured, of course, in the presence of cosmic rays coming from outer space, but the scintillation counter gives better discrimination against cosmic rays than does a geiger counter.

The possibility of discovering directly by scintillation counter a payable deposit of uranium or thorium is fairly remote. The instrument has a wide cone of acceptance of gamma rays, and it has been found that the presence of granite masses commonly gives rise to large anomalies which are indistinguishable from possible ore bodies.

A problem that has still to be solved satisfactorily is how to separate the radiations from thorium, uranium and potassium, another radioactive element which is much more common in the earth's crust but is of no economic interest.

To be of use, the magnetic, electromagnetic and radiometric data obtained by the geophysical instruments in the survey aircraft must next be put on paper and analysed.

The first task is to plot the actual course flown by the aircraft. This tracking is done by finding the position of the spotting-camera photographs on the aerial mosaic every mile or so. All the electronic instruments in the aircraft have marker pens and their traces can be correlated with the numbered spotting photographs. Thus any length of trace tape can be fitted between two known positions on the ground.

Theoretically, the aircraft flies in a straight line at a constant speed between check points or fixes. It does not, of course, always actually do that ; but, by taking fixes at sufficiently close intervals, it is possible, if topographic detail permits, to obtain a high degree of accuracy in tracking the aeroplane's course.

The plotted flight lines are then transferred from the mosaic to a base map, i.e., a map on which the final contours are produced.

The magnetic information must then be expanded or contracted so that a length of recorder tape will fit a changing scale and each measurement allotted to its correct position on the ground. Adjustments must also be made to allow for various factors such as, to mention one, diurnal variation of the earth's magnetic field.

This done, the information is plotted on the flight lines on the base map. The results are then contoured. In all, three separate contour maps are produced—one for each set of geophysical data.

Plotting of airborne information is a laborious process and takes substantial time and staff. So, although the flying can be done quickly, there is at present inevitable delay in producing the results. The design of new electronic drafting and calculating machines would greatly speed up a tedious exercise.

From these maps, together with geological information and detailed aerial photographs of the ground, the geophysicist and geologist jointly decide which areas are likely to be of most interest as far as mineralization is concerned.

Thereafter, a programme can be drawn up for geological, geochemical and geophysical work to proceed on the ground to ascertain more exactly the meaning of the airborne geophysical anomalies and to detect whether economic mineral deposits exist.

Compared with the oil industry elsewhere, the mining industry in Africa has made relatively little use of geophysical prospecting and even less of airborne geophysical exploration. Dispositions of ore bodies and structural relations make interpretation of geophysical data difficult; and the rugged topography of most mineral bearing areas adversely affects some geophysical methods.

With the rapid advances being made in electronics, however, there is some prospect, that in the not too distant future new computers and navigational instruments of extreme precision to eliminate the effects of the aircraft's motion may be produced. Should that come to pass, many of the existing problems could be solved, thereby enhancing the value of the assistance to be derived from aerial geophysical surveys in future searches for minerals.

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Personalities

President of Guinea visits London

H E The President of the Republic of Guinea and Madame Sekou Touré paid an official visit to the United Kingdom from 5/10 November, as guests of HM Government This is the first visit by a President of Guinea since that country obtained independence in October 1958.

President and Madame Touré were received by Her Majesty The Queen at Buckingham Palace and official talks were held between the President and the Prime Minister and Foreign Secretary.

A full programme of visits was also planned including a visit to the House of Commons, Kew Gardens and a view of the Lord Mayor's Show which took place on 14 November.

In the President's party were also: M. Diallo Saifoulaye, Speaker of the Guinea National Assembly; M. Keita Fodeba, Minister of the Interior and Security; Dr. Louis Lansana Beavogui, Minister of Economic Affairs; M. Nabi Youla, Ambassador to Great Britain, France, Switzerland and the Federal Republic of Germany; Dr. Konté Seydou, Ambassador-Designate to the USSR and Commandant Keita Noumandian, Chief of the National Army.

Guinea Ambassador to London

H E Mr. Nabi Youla, the first Ambassador for Guinea to London, presented his letters of credence to HM The Queen on 4 November 1959. Mr. Nabi Youla is also Ambassador to France, Switzerland and the Federal Republic of Germany and resides in Paris. The Government of Guinea will shortly be opening an Office in London, until such time the High Commission for Ghana is acting on their behalf.

Nigerian Instructor

Mr. Wahabi Bandele, a Nigerian engineer, has just spent a successful three months at the Atlas Copco factory, Stockholm, Sweden.

Mr. Bandele is employed by the Nigerian Tool & Die Co Ltd, agents of Atlas Copco AB in Lagos. He went to Stockholm to learn how to operate, service and repair portable compressors, pneumatic tools, drills, etc. He is to serve the Nigerian Tool and Die Co Ltd as an instructor/service engineer and will instruct fellow Africans how Atlas Copco products are to be used.

Mr. Bandele has had six years' experience with diesel engines and is considered to be one of Atlas Copco's keenest pupils. At the end of his course he was awarded a diploma from the Atlas Copco service school for his ability.

UK Secretary of State for Colonies to visit East Africa

It was announced in the House of Commons that Mr. Iain McLeod, Secretary of State for the Colonies, will visit Kenya in December, and while there will take the opportunity of also visiting Uganda and Tanganyika.

Visit to Ghana

Mr. Eric Louw, Minister of External Affairs in the Union of South Africa is to visit Ghana in August 1960. He received a personal invitation from Dr. Nkrumah to visit Ghana on his return from the USA in October 1959 but was unable to do so due to previous commitments.

It is announced by the Ghanaian Ministry of Foreign Affairs that the invitation was linked with the proposal that a Ghanaian Cabinet Minister should visit the Union with the object of discussing, among others, proposals for establishing a Ghana mission in the Union.

Prime Minister's trip to Africa

It was announced that the British Prime Minister, Mr. Macmillan, and Lady Macmillan will visit Ghana, Nigeria, the Federation of Rhodesia and the Union of South Africa during January 1960. The tour is expected to start on 5 January and to end early in February. The East African territories will not be included due to the limited time available.

New Appointments for Palm Line (Agencies) Limited

The Board of Palm Line (Agencies) Limited announce that Mr. G. M. Duncan has been appointed General Manager of the Company in Ghana. This is a new appointment.

Mr. Duncan, who is forty years of age, began his shipping career with the Booth Steamship Company in Liverpool. He has had a wide experience of West African shipping and after serving in various posts he was appointed Manager at Accra in 1956.

It has also been announced that Captain G. W. Howe has been appointed Assistant General Manager for Nigeria.

Both appointments are effective from 1 December 1959.

United Africa Company of Ghana

The United Africa Company of Ghana Limited announces that Sir Patrick Fitz-Gerald, OBE will relinquish the position of Chairman on his retirement from their service which will take effect from the 31 March 1960. The following appointments have been made to take effect on the same date: Chairman, Mr. H. C. Hockley ; Managing Director, Mr. P. R. Marriott.

Mr. J. W. Bethell has been appointed to the post of Deputy Managing Director. He will relinquish the post of Supervising Manager, Kingsway Stores, to Mr. A. W. R. Wood, who will take over in the latter part of January 1960.

Deputy Governor, Northern Nigeria

Mr. H. A. S. Johnston, who is Permanent Secretary to the Premier of Northern Nigeria, has been appointed Governor of the Northern Region of Nigeria. Mr. A. T. Weatherhead, the present Governor will shortly be retiring.

On the right, Mr. Bandele receives his diploma from Mr. Olof Nibell, Export Manager of Atlas Copco AB in Stockholm.

Text of the NILE WATERS AGREEMENT between the Republic of the Sudan and the United Arab Republic signed on 8 November 1959

IN VIEW OF THE NEED FOR PROJECTS to control fully the river Nile and to increase its flow for the full use of its waters by the Republic of the Sudan and the United Arab Republic by means other than those technical means which are now in use, and as these works need, for their construction and administration an agreement for complete co-operation between the two Republics in order to organize the benefits and the use of the river waters in such a way as to secure their present and future needs, and as the Nile waters agreement concluded in 1929 regulated partial use of the Nile waters, the scope of which did not measure up to the full control of the river waters, the two Republics have agreed on the following:

Article 1: *Present Prescriptive Rights*

The quantity of the Nile waters used by the United Arab Republic up to the signing of this agreement shall be her prescriptive right before securing the benefits of the projects referred to in the Agreement for the control of the river and the increase of its discharge. This right amounts to 48 milliards (million cubic metres) calculated annually at Aswan.

That quantity which the Republic of the Sudan uses at the present time shall be her prescriptive right before securing the benefits of the projects referred to. This right amounts to 4 milliards calculated annually at Aswan.

Article 2: *Nile Control Projects*

For the control of the river waters and the prevention of its flow into the sea, the two Republics agree that the UAR may construct the High Dam at Aswan as a first link in a series of projects on the Nile for continual storage.

To enable the Sudan to make use of her share the two Republics agree that the Republic of the Sudan may build the Roseires Dam on the Blue Nile and any other works which the Republic of the Sudan considers necessary for making use of her share.

The net gain from the High Dam shall be calculated on the average natural discharge of the river at Aswan during the years of the present century estimated at 84 million cubic metres annually. Deducting from this the prescriptive rights of the two Republics referred to in the First Article as estimated at Aswan, and deducting also the average losses from continual storage by the High Dam, it leaves a surplus gain for the distribution between the two Republics.

The net gain from the High Dam referred to in the preceding Article shall be divided between the two Republics at the rate of 14.5 per cent for the Sudan to 7.5 per cent for the UAR as long as the average discharge in future remains within the limits of the average discharge referred to in the preceding Article. This means that if the average flow continues to equal the average of the past years of the present century, estimated at 84 milliards, and if the loss from evaporation remains as now estimated at 10 milliards, the net gain from the Aswan High Dam will thus be 22 milliards, of which the share of the Republic of the Sudan shall be 14.5 milliards and that of the UAR 7.5 milliards, and, in adding those shares to the prescriptive rights, the shares from the net flow of the Nile after full operation of the High Dam will become 18.5 milliards for the Republic of the Sudan and 55.5 milliards for the UAR. If the average increases the net gain resulting from the increased flow shall be divided equally between the two Republics.

As the net gain from the High Dam referred to in Paragraph 3 is taken from the average flow of the river at Aswan during the years of the present century after deducting from this amount the prescriptive rights of the two countries and the losses by continual storage in the High Dam, it is given that the quantity will be subject to checking by the two parties after sufficient intervals to be agreed upon with effect from the beginning of full operation of the High Dam.

The Government of the UAR agrees to pay to the Government of the Republic of the Sudan a sum of £E 15 million as full compensation for the damage to the existing Sudanese property as the result of storage by the High Dam to a level gauge of 182. The compensation shall be paid in the manner agreed upon by the two parties, either in sterling or any other currency as agreed, as follows: January 1960, £E 3 million; January 1961, £E 4 million; January 1962, £E 4 million; January 1963, £E 4 million.

The Government of the Republic of the Sudan undertakes to take all steps to transfer the inhabitants of Halfa and the other Sudanese inhabitants concerned whose land will be flooded by the stored waters provided their transfer shall be finally completed before July 1963.

It is given that the full operation of the High Dam for the continual storage will result in no further need by the UAR for storage in Jebel Aulia. The contracting parties shall discuss questions relative to this in due course.

Article 3: *Projects to use water lost in the Nile Basin*

Whereas quantities of Nile waters are now lost in the swamps of Bahr El Jebel, Bahr El Zaraf, Bahr El Ghazal and the river Sobat, it is essential to prevent this loss in order to increase the rivers flow for agricultural expansion in the two countries. The two Republics therefore agreed on the following:

The Republic of the Sudan, in agreement with the UAR shall construct projects to increase the Nile flow through the prevention of loss of water in the Nile Basin in the swamps of Bahr El Jebel, Bahr El Zaraf, Bahr El Ghazal and its tributaries, the river Sobat and its tributaries and the White Nile Basin. The new benefits from these projects shall be shared equally between the two Republics who will contribute to the cost in the same proportion. The Republic of the Sudan will undertake to finance the projects referred to from its own funds and the UAR will pay its share of the cost at the same rate of one-half as is allocated to her from the benefits of the projects.

If the UAR finds it necessary, in accordance with its existing plans for agricultural expansion to start one of the projects referred to in the preceding paragraph, to increase the flow of the Nile, and after approval of this by the two Governments, at a time when the Republic of the Sudan does not feel such a need, the UAR will inform the Republic of the Sudan of the appropriate time to start construction of the project and in two years from the date of notification, each of the two Republics will present a programme for the use of their respective shares of the water which will result from the project, and the date fixed for its use. This programme will be binding on the two parties. On expiry of the two years the UAR will begin to carry out the project, bearing the cost herself. When the Republic of the Sudan is ready to make use of her share in accordance with the agreed programme, she shall pay to the UAR a proportion of the total cost equal to the proportion which she obtains from the net benefit of the project, provided that the share of either of the two Republics shall not exceed one-half of the total gain from the project.

Article 4: *Technical Co-operation between the two Republics*

To achieve technical co-operation between the Governments of the two Republics and to proceed with the necessary research and study of projects for control of the river and the increase of its output and also for the continuance of hydrological observation on the upper reaches of the Nile, the two Republics agree to set up a permanent technical committee from the Republic of the Sudan and the UAR, with equal representation, to be formed after the signature of this agreement, and its terms of reference will be:

(a) To prepare the main plans for projects aimed at the increase of the Nile output and the supervision of the necessary research

for the preparation of projects in final form for submission by the Committee to the Governments of the two Republics for approval.

(b) To supervise the carrying out of the projects which the two Republics will decide.

(c) To draw up systems for the operation of the works constructed on the Nile inside the boundaries of the Sudan and the systems for the operation of the works constructed outside the boundaries of the Sudan, in agreement with those concerned in the countries in which such projects are established.

(d) To supervise the execution of all the systems of the operations referred to in paragraph (c) through the engineers detailed for the work who shall be officials of the two Republics in respect of works constructed inside the boundaries of the Sudan, the High Dam and the Aswan Dam, and in accordance with the agreements concluded with the other countries on the projects of the Upper Nile constructed inside their boundaries.

(e) As it is probable that consecutive years of low flow may occur with consequent drop in the level of the reservoir at the High Dam to such an extent that it will not be possible to withdraw the full requirements of the two countries in any one year, it will be the task of the Committee to draw up a system which the two Republics should follow in order to meet such a situation in the lean years so that no harm should befall either of them. The committee shall present recommendations in this respect for the approval of the two Governments.

To enable the Committee to discharge the responsibilities specified in the preceding paragraph and to continue the recording of the Nile level and its behaviour in all its upper reaches, engineers of the UAR and the Republic of the Sudan shall carry out this work in the Sudan the UAR and Uganda, under technical supervision of the Committee.

The two Governments shall issue a joint declaration constituting the joint technical Committee and shall prepare the budget necessary for it from the funds of the two countries. The Committee can meet in Cairo or Khartoum according to the circumstances. It will have to draw up the internal rules of procedure, to be approved by the two Governments for the organization of its meetings, and technical, administrative and financial activities.

Article 5: *General*

When the need arises to hold any discussion on the Nile waters with any riparian countries other than the two Republics, the Governments of the Republic of the Sudan and the UAR shall agree on a common view regarding this, after study by the technical Committee referred to above .

This view shall be the one on which the Committee shall base its contacts with the country referred to.

If the discussion results in agreement to carry out works on the river outside the boundaries of the two republics, it shall be the task of the joint technical Committee to lay down—through liaison with those concerned in the Governments of the countries concerned—all the technical details regarding the carrying out and the organization and the necessary maintenance of such works. After the approval of these details and recognition by the Governments concerned, it shall be the task of the Committee to supervise the execution of the provision of such technical agreements.

As the riparian states, other than the two contracting Republics, demand shares in the Nile waters, the two Republics agree to discuss jointly the demands of these states and to agree on a united view regarding them. If the discussion results in the possibility of agreeing to any quantity, calculated at Aswan, shall be deducted equally from their two shares. The Joint Technical Committee referred to in this agreement shall, with those concerned in their countries, ensure that the quantities agreed upon are not exceeded.

Article 6: *The transitional period before full benefits are received from the Aswan High Dam*

As the two Republics will not begin to benefit from the shares determined upon from the net gain resulting from the High Dam before its complete construction, the two parties shall, in the transitional period between now and the completion of the construction of the High Dam, agree on their agricultural expansion in such a way as not to affect their present water requirements.

Article 7

This article shall come in to force after ratification by the two contracting parties, provided that each side shall inform the other through diplomatic channels of the date of ratification.

Article 8

The Appendix attached to this Agreement shall be considered an inseparable part of it.

Appendix 1: *Water loan*

The Republic of the Sudan agrees to the principle of lending the UAR part of her share of water in the High Dam to meet necessities arising from the continuation of the UAR's programme of agricultural expansion. The UAR will ask for such a loan in five years' time after checking its programme and need for such a loan. The Sudan will loan a maximum of 1.5 milliards provided that the UAR ceases to exploit this loan by November 1977.

TRADE AGREEMENTS

W Germany—Liberia

An agreement for technical and economic co-operation was signed in Bonn, W Germany, on 17 November 1959, between West Germany and Liberia. West German experts will give advice on economic development and will provide materials and staff for the setting up of schools and colleges. In addition scholarships will be founded for Liberians to study in W Germany.

Czechoslovakia—Tunisia

A new trade and payments agreement between Czechoslovakia and Tunisia has been signed in Tunis, and provides for a 23% increase in the exchange of goods during 1960 as compared with 1959. Czechoslovakian imports will include iron ore, phosphates, and agricultural produce and exports will be products of the engineering industry and various kinds of consumer goods.

UK—Guinea

A trade agreement was signed in Conakry on 22 October, between the United Kingdom and the Republic of Guinea. Quotas, established for United Kingdom exports will provide increased facilities and trade liberalization measures will continue to benefit Guinean exports to the United Kingdom. Trade with the UK dependent territories is also covered and special provision has been made for Hong Kong exports to Guinea.

W Germany—Guinea

In November an agreement for trade, technical aid and cultural co-operation was initialled between W Germany and Guinea. It is expected that full details will be worked out in Conakry during 1960 where a West German trade delegation is due to arrive next spring. Technical aid is proposed in the developing of Guinea's mineral resources, transport system and the expansion of export trade. One million DM has been allotted from the 1960 budget for the training of technicians from Guinea.

UK—Tunisia

In November a trade agreement was signed between the United Kingdom and Tunisia allowing for £1.5 million worth of UK exports to Tunisia. These exports will be from both the United Kingdom itself and from colonial territories. The principal items are : Tea £120,000; sugar £200,000; cloth £225,000; motor-cars £75,000; aviation equipment £100,000; shipping equipment £50,000.

Trade Fair (Ghana)

A committee has been formed of Government departments and business houses in Kumasi, Ghana, to make arrangements for holding a Trade Fair on 28, 29 and 30 January 1960.

Miscellaneous Information

Textile Machinery and Dyed Yarn (Kenya)

Mr. V. D. Joshi, of the Kenya Knitting and Weaving Works, PO Box 780, Nairobi, has told the United Kingdom Trade Commissioner at Nairobi, that his firm which is in the process of being formed, have made an application to the East African Industrial Licensing Authorities for an Industrial Licence to operate a factory for the weaving of towels, bedspreads, table cloths and fine curtains from cotton and rayon yarn. It is understood that the application will be considered in November 1959.

Mr. Joshi would like to receive quotations from United Kingdom firms for the supply of 15 automatic looms which he intends to purchase as soon as the licence is granted, to be followed by a further 15 in due course. He also requires quotations for one calender machine, a winding frame of about thirty spindles and one warping machine capable of supplying thirty looms.

In addition he would like to receive quotations for dyed yarn. It is estimated that his firm will require 15,000 lb rayon yarn and 25,000 lb cotton yarn per month, comprising dyed single yarns of count six's for towels, ten's for bedspreads and table cloths, and twenty's and thirty's for furnishing fabrics.

Mr. Joshi of the Kenya Knitting and Weaving Works is also a partner in a firm of drapers, general merchants and commission agents who have purchased machinery, cotton and rayon piece goods from the United Kingdom. He is considered to be a suitable connection for United Kingdom firms.

Manufacturers interested in this enquiry should write direct to Mr Joshi. It would be appreciated if, at the same time, they would notify the United Kingdom Trade Commissioner, PO Box 30133, Memorial Hall, Delamere Avenue, Nairobi, Kenya Colony, that they have done so.

Moroccan Currency

The value of the Moroccan franc will in future be 1 milligramme 75609 gold, or one Dirham equivalent to 175 milligrammes 609 gold. Exchange rates would be as follows:
1000 Moroccan francs = .975,6 French francs
1000 French francs = 1025 Moroccan francs
1 US Dollar = 506 Moroccan francs
1£ Sterling = 1420 Moroccan francs

Rhodesia and Nyasaland

Import licence requirements have now been extended to second-hand accounting machines, cash registers, calculating machines, tabulators, sorting machines, computators, receipt and coin counting machines, ledger and posting machines.

Decimalization (South Africa)

The United Kingdom Trade Commissioner at Pretoria has reported the following Press statement issued recently by the Union of South Africa's Minister of Finance:

"The Minister of Finance announces that the Government has given further consideration to certain recommendations of the Decimal Coinage Commission and that, after consultation with the Decimalization Board, it has been decided:

(1) that all existing bank notes and silver coins shall be kept in circulation at unchanged values and that, with the exception of the 2s. 6d. coin, no special steps shall be taken to withdraw them from circulation;

(2) that as far as the new bronze coins are concerned, only one cent and half cent coins, distinguishable from the existing bronze coins by their colour and design, shall be minted, i.e., that no quarter cent coin shall be minted.

(3) Machine Companies have already been advised that no provision need be made for the last mentioned denomination in the conversion of machines. So as to ensure greater certainty in planning for the change-over to the new coinage system, it is further announced that the official change-over date or D-day, will be the 2nd Tuesday of February 1961.

The Minister expresses the hope that in view of this decision, everybody will now take active steps to prepare himself for the change-over on D-day".

(*Board of Trade, London.*)

European Common Market

It has been stated that exports of coffee and cotton from East Africa may be seriously affected by the European Common Market. Cotton and coffee account for 85% of Uganda's exports and 60% of exports from East Africa as a whole. Germany, at present East Africa's biggest customer for coffee, will, in due course, be able to purchase duty-free coffee from French and Belgian African territories, but imports from East Africa will be subject to a 16% duty.

Ferranti Transformers—Nigeria

For the extensive Transmission Scheme in the Western Region of Nigeria, Ferranti Limited have received an order from the Electricity Corporation of Nigeria for transformers worth over £70,000.

The order covers the supply of three 12.5 MVA units, 132/11 kV fitted with resistor type on-load tap changing gear; one 5 MVA unit, 132/33 kV fitted with resistor type on-load tap changing gear and one 33 kV earthing transformer.

The Investment Company of Nigeria

This Company, which was incorporated in Nigeria on 17 October 1959, has as its object the business of assisting enterprises engaged in industry, commerce, agriculture and the exploitation of natural resources in Nigeria. It is controlled by private enterprise and has the support of established Nigerian and United Kingdom firms.

The Company grants general assistance, among other means, by assisting in the creation, expansion and modernization of enterprises in Nigeria and in particular, through financial aid by loans, underwriting, the guaranteeing of loans and through the furnishing of technical and administrative advice.

It is hoped by the Company to enter into co-operation with other development corporations working in Nigeria and with specialized organizations. It is not expected that adequate reserves will have been accumulated for some years but dividends will be considered when the position is considered favourable.

The Company's address in Lagos is Development House, 6 Labinjo Lane, and the United Kingdom, 27 Old Jewry, London, EC 3.

Publications Received

LAPIS—industrial opportunities. Published by Kenneth Mason Publications, Ltd, 1 Old Burlington Street, London, W1. Subscription rate 10 guineas annually (3 year susbcription 25 guineas). The name LAPIS stands for Licences, Agents, Patents and Inventions, and this booklet, which appears monthly, includes information on all these subjects. The information is on an international basis and is provided primarily for policy makers of companies who seek new products for manufacture either in their own plants or for outlets for their patents. The information is included in the issues free of charge and business firms seeking or wishing to impart information on any of these four specific categories should contact the publishers.

Guide Economique du Cameroun, 1959. In the preface of this reference book it is pointed out that due to the continuous and rapid expansion of the territory it is impossible to give a comprehensive account of all aspects of the country. However, considerable information is included and will form a useful background to anyone wishing to become more acquainted with the economic problems of the area. Material included cover geography and climate, political background, industrial matters, trade and communications. A revised edition will be published in 1960 which should have a more detailed format. The book is published in French and can be obtained through the Commercial Section of the French Embassy, London.

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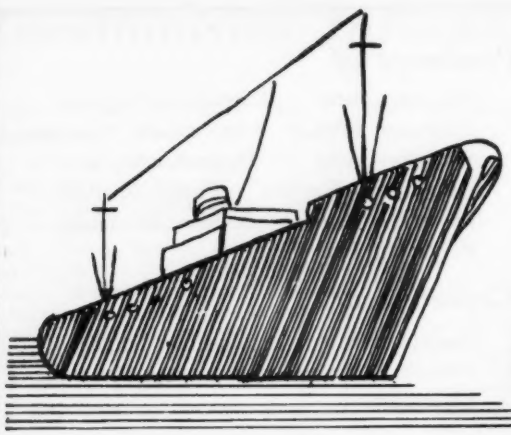

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